

What is claimed is:

[Claim 1] An air-powered vacuum tool for handling multiple workpieces, comprising:

a plurality of vacuum ports formed in a vacuum manifold body;
a plurality of air-powered vacuum generators operatively connected with said vacuum manifold body, such that each of said vacuum ports is provided with vacuum; and
a plurality of pickup orifices adapted for engaging workpieces, with each of said pickup orifices being operatively connected with at least one of said vacuum ports.

[Claim 2] An air-powered vacuum tool according to Claim 1, wherein said vacuum ports are formed such that at least some of said ports are not in fluid communication with all other of said ports.

[Claim 3] An air-powered vacuum tool according to Claim 1, wherein at least one of said vacuum ports is formed such that it is not in fluid communication with any other of said ports.

[Claim 4] An air-powered vacuum tool according to Claim 1, wherein at least one of said vacuum ports is provided with vacuum by a dedicated one of said vacuum generators providing vacuum to only said at least one vacuum port.

[Claim 5] An air-powered vacuum tool according to Claim 1, further comprising at least one common blow-off manifold for conducting high pressure air to each of said vacuum ports.

[Claim 6] An air-powered vacuum tool according to Claim 1, further comprising a robot, operatively associated with said vacuum tool, for positioning said vacuum tool.

[Claim 7] An air-powered vacuum tool for handling multiple workpieces, comprising:

a plurality of independent vacuum ports formed in a vacuum manifold body, with each of said vacuum ports being operatively associated with a unique plurality of workpiece engaging pickup orifices;
a plurality of air-powered vacuum generators operatively connected with said vacuum manifold body, such that each of said vacuum ports is provided with vacuum generated by at least a dedicated one of said vacuum generators; and a plurality of pickup orifices adapted for engaging workpieces, with each of said pickup orifices being operatively connected with at least one of said independent vacuum ports.

[Claim 8] An air-powered vacuum tool for handling a plurality of workpieces, comprising:

a baseplate;
a vacuum manifold body mounted to an underside of said baseplate, with said manifold body having a plurality of vacuum ports;
a plurality of air-powered vacuum generators mounted to an upper surface of said baseplate, with said vacuum generators being operatively connected with said vacuum manifold body, such that each of said vacuum ports is provided with vacuum generated by at least one dedicated vacuum generator;
a plurality of pickup orifices adapted for engaging workpieces, with said pickup orifices being formed in a removable workpiece interface plate attached to an underside of said vacuum manifold body, with each of said pickup orifices being operatively connected with at least one of said vacuum ports;
and

a blowoff system adapted to conduct high pressure air to each of said vacuum ports, so as to separate workpieces from said pickup orifices.

[Claim 9] An air-powered vacuum tool for handling multiple workpieces according to Claim 8, wherein said workpiece interface plate comprises an elastomeric plate having said plurality of pickup orifices formed therein.

[Claim 10] An air-powered vacuum tool according to Claim 8, further comprising a plurality of air-powered outboard workpiece stabilizers adapted to engage stray workpieces following a blowoff.

[Claim 11] An air-powered vacuum tool according to Claim 8, wherein said plurality of vacuum generators is supplied with high pressure air by a plurality of air supply manifolds mounted to said baseplate, with said air supply manifolds being isolated such that at least some of said vacuum generators may be powered selectively.

[Claim 12] An air-powered vacuum tool according to Claim 11, wherein said plurality of air supply manifolds is provided with high pressure air controlled by a plurality of air valves mounted upon said baseplate.

[Claim 13] An air-powered vacuum tool according to Claim 8, wherein said at least one of said plurality of air-powered vacuum generators comprises a venturi vacuum generator.

[Claim 14] An air-powered vacuum tool according to Claim 8, wherein at least some of said vacuum ports are isolated from the remaining ones of said vacuum ports.

[Claim 15] An air-powered vacuum tool according to Claim 8, wherein said plurality of vacuum ports is divided into a plurality of vacuum port groupings.

[Claim 16] An air-powered vacuum tool according to Claim 8, further comprising a robot arm attached to said baseplate for positioning said vacuum tool.

[Claim 17] An air-powered vacuum tool according to Claim 8, further comprising a transfer machine attached to said baseplate, for positioning said vacuum tool.

[Claim 18] An air-powered vacuum tool according to Claim 8, wherein said blowoff system is adapted to conduct high pressure air to each of said vacuum ports simultaneously.

[Claim 19] An air-powered vacuum tool according to Claim 8, wherein said workpieces comprise liquid tight containers.

[Claim 20] An air-powered vacuum tool according to Claim 8, wherein said workpieces comprise cartons containing a plurality of items.